

NOTES ON FISHES FROM MAHABLESHWAR AND WAI, (SATARA DISTRICT, BOMBAY STATE)

BY

E. G. SILAS, M.A., M.SC.

N.I.S.I., Junior Research Fellow

(From the Laboratories of the Zoological Survey of India)

(With one plate and four text figures)

INTRODUCTION

In April 1952, at the suggestion of Dr. S. L. Hora, I received an invitation from the authorities of the Bombay Natural History Society to visit Mahableshwar along with a party from the Society for an investigation of the fauna of that place. This invitation was readily accepted, especially as I was setting out on a fish survey tour to the northern parts of the Western Ghats and Kathiawar. Since Annandale's work on the fauna of certain hill-streams in the Bombay State (Annandale, 1919), no fish collection seems to have been reported from the Satara District¹. The notes embodied in this paper are based on collections made in the course of the tour from Mahableshwar and from Wai on the Krishna River, about 20 miles east of Mahableshwar lying on the Mahableshwar-Poona road. The main purpose of the visit to Mahableshwar was to investigate the fauna of the famous 'Robbers' Cave', and while there opportunity was also taken to make collections from the streams in and around the hill-station. Among the fishes collected one species has proved new to science and is described here.

NOTES ON LOCALITIES

Situated 17°56'N. and 73°40'E., Mahableshwar, with a general elevation of over 4,500 feet, receives very heavy rainfall annually, averaging over 290 inches. A number of streams originate from the hill-sides which ultimately grow into four main rivers, the Krishna, the Yenna and the Koyna flowing to the east, and the Savitri flowing to the west. In April, most of the smaller streams had dried up, but collections were made mainly from the Lake, Yenna River, a pool in a dried stream bed close to the Yenna Falls and from 'Robbers' Cave'. The lake on the hill-top, which has a surface area of about 30 acres, is fed by perennial springs and has water all round the year. From a bog below the lake, the Yenna River originates, first as a small streamlet, growing larger as it winds its way touching a number of gardens. The stream bed is mostly rocky and collections were made from the stream from its commencement upto the Yenna Falls.

¹ Kulkarni, C. V. (1952, *Rec. Ind. Mus.*, xlix, pp. 231-238) reports the discovery of a new genus of schilbeid catfishes from the Krishna River near Islampur, Satara District and Panchganga River near Kolhapur, Bombay State.

Though there are a large number of caves in India, unfortunately our knowledge of the fauna that they may possess is very meagre. Reviewing our knowledge of the zoology of the caves of Burma and Malaya Peninsula, Annandale and Gravely (1914) drew attention to the fact that the fauna of the caves of this region was, as a whole, far less specialised than that of the caves of Europe and North America. In India, this was well exemplified by the investigations of the fauna of the Siju Cave, Garo Hills, Assam, where a majority of the animals collected belonged to species which occurred usually outside the cave, and the few species which did exhibit any adaptation to cave life were only partially or incompletely modified. Reporting on the fishes collected from the Siju Cave, Hora (1924) cited two instances of partial colour loss, one in a loach, *Nemachilus* sp., and another in one specimen of *Ophiocephalus gachua* Hamilton, while all the other six species of fish collected from the cave showed normal colouration. Our visit to 'Robbers' Cave', which lies about four miles south east of Mahableshwar, was fruitful in that some interesting observations were made on the fish life in the cave. Of course, we were disappointed to a certain measure in our hopes that the water inside the cave would yield species of great zoological interest, but all the same we were able to collect a number of specimens of one species of fish, *Nemachilus evezardi* Day, which in its loss of colouration showed partial adaptation to cavernicolous conditions of life. Notes on this loach are given at the end (*vide infra*, p. 588). From Hora's observations on the fish fauna of the Siju Cave and the present investigations of 'Robbers' Cave', it would seem that loaches of the *Nemachilus* type, which usually find their way even to the very head-waters of hill-streams, could, when they are isolated in caves, easily adapt themselves to such environmental conditions.

The topography of the cave resembles that of a tunnel which ends blindly. It is about a hundred feet long and about ten feet wide at the mouth and in the interior the passage is about eight to ten feet high and about twelve feet broad, while at the farther end it is much narrower, the roof being very low. In recent years, the roof a few feet from the mouth had fallen down, thus permitting entrance of light that way also. The whole cavern pervades with the nauseating smell of bats which were found in hundreds. The air inside the cave was also very stuffy and the passage to the interior was made difficult by swarms of bats and bat-parasites. Our visit was at a time when the water level was at its lowest and it was found stagnant confined to two sections of the cavern, both being separated by a few feet of slabs and boulders which had fallen from the roof, and remained slightly higher than the water level. The first stretch of water which was about $2\frac{1}{2}$ feet deep for the first 30 feet or so from the second entrance was thoroughly polluted by bat-guano which formed a thick bottom deposit as well as a scum on the surface. Even after repeated nettings we could not obtain any fish or other aquatic organisms from this stretch. The loach, *N. evezardi*, was obtained from the farther end of the cave where the water was clearer, less deep, and was spring-fed. Mr. Humayun Abdulali, who was with us and had earlier visited the cave after the monsoons, said that there usually is a little outflow of water at that time as the level of water inside the cave was

considerably high making it even more difficult to wade through to the farther end. Much of the deposits of bat-guano is washed out at this time. Such an outflow of water from the cave would naturally help in the immigration of loaches from the neighbouring watershed to the cave.

The remaining collections were made from the Krishna River at Wai. The river is very rocky just below the bridge at Wai, and its right bank at this place is lined for about half a mile by temple steps. Being summer, the flow of water was not so great and collections were made from this section of the river as well as from the upper course of the river where the banks are rather low and overhung with grass and trees.

In the following table are listed the species and the total number of each, collected from different localities. For convenience, in the table the localities are numbered as (1) Lake at Mahableshwar, (2) Yenna River upto Yenna Falls, (3) Pool in dried stream bed close to Yenna Falls, (4) Robbers' Cave, Mahableshwar and (5) Krishna River at Wai.

List of species	No. of specimens collected	Localities				
		1	2	3	4	5
Order Cypriniformes.						
Division Cyprini.						
Suborder Cyprinoidei.						
Family Cyprinidae.						
Subfamily Rasborinae.						
<i>Barilius barna</i> (Hamilton) ...	14	—	—	—	—	x
<i>Barilius bendelisis</i> (Hamilton)...	4	—	—	—	—	x
<i>Rasbora daniconius</i> (Hamilton).	3	—	x	—	—	—
Subfamily Cyprininae.						
<i>Puntius jerdoni</i> var. <i>maciveri</i> (Annandale) ...	15	—	—	—	—	x
<i>Puntius kolus</i> (Sykes) ...	1	—	—	—	—	x
<i>Puntius sahyadriensis</i> sp. nov. ...	102	—	x	—	—	—
<i>Puntius ticto</i> Hamilton ...	22	—	x	—	—	x
<i>Tor mussullah</i> (Sykes) ...	5	x	—	—	—	x
Subfamily Garrinae.						
<i>Garra mullya</i> (Sykes) ...	4	—	x	—	—	x
<i>Parapsilorhynchus tentaculatus</i> (Annandale) ...	18	—	—	x	—	—
Family Cobitidae.						
Subfamily Nemachilinae.						
<i>Nemachilus evezardi</i> Day ...	32	—	—	x	x	—
<i>Nemachilus denisonii</i> Day ...	7	—	—	—	—	x
Order Ophiocephaliformes.						
Family Ophiocephalidae.						
<i>Ophiocephalus gachua</i> Hamilton	1	—	x	—	—	—
<i>Ophiocephalus punctatus</i> Bloch.	27	—	x	—	—	x

In addition to the fishes, the collection also includes two genera of Mollusca (*Lamellidens marginalis* (Lamarck) and *Parreysia cylindrica* Annandale, from the Krishna River at Wai), four genera of insects (*Oreitochilus* sp., and *Dinentus indicus* Abue, of the family Gyrinidae and *Hydaticus vittatus* Fabre, and *Rantus* sp. of the family Dytiscidae), a crustacean *Palemon kistnensis* Tiwari (both from Wai and Mahabaleshwar) and a number of frogs, tadpoles and three species of bats.

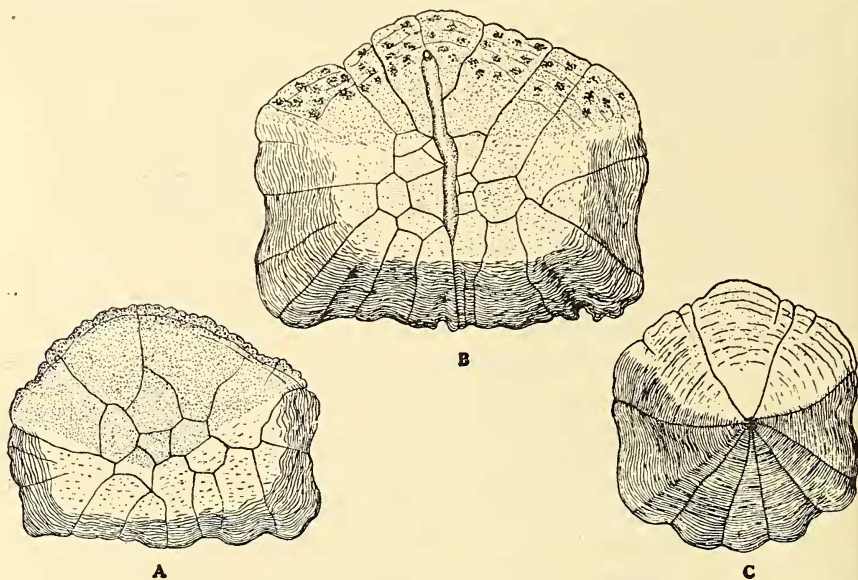
NOTES ON CERTAIN SPECIES

Most of the 14 species of fish mentioned in the table above are fairly common and have a wide distribution. A description of the new species *Puntius sahyadriensis* and notes on *Nemachilus evezardi* Day are given below:

*Puntius sahyadriensis*¹, sp. nov.

D.3/8-9; P.13; V.9; A.3/5; C.19; L.1.23-24.

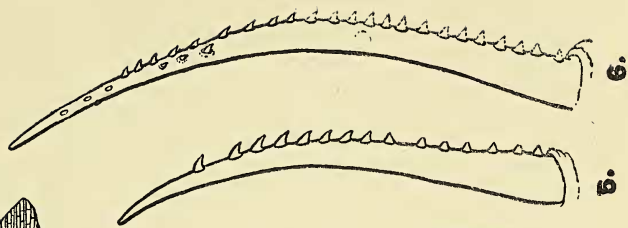
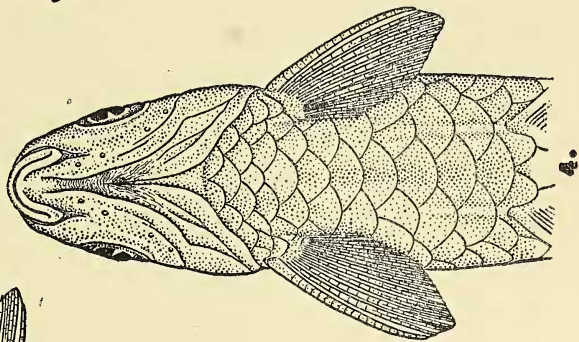
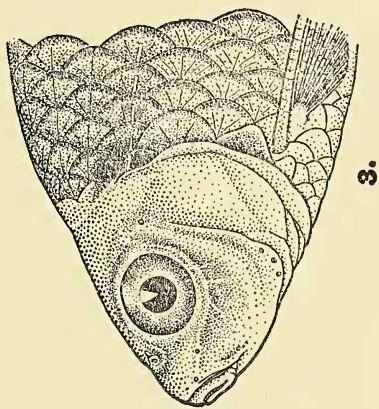
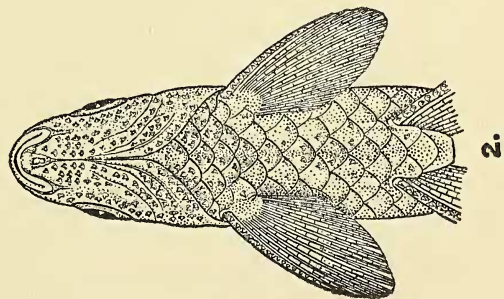
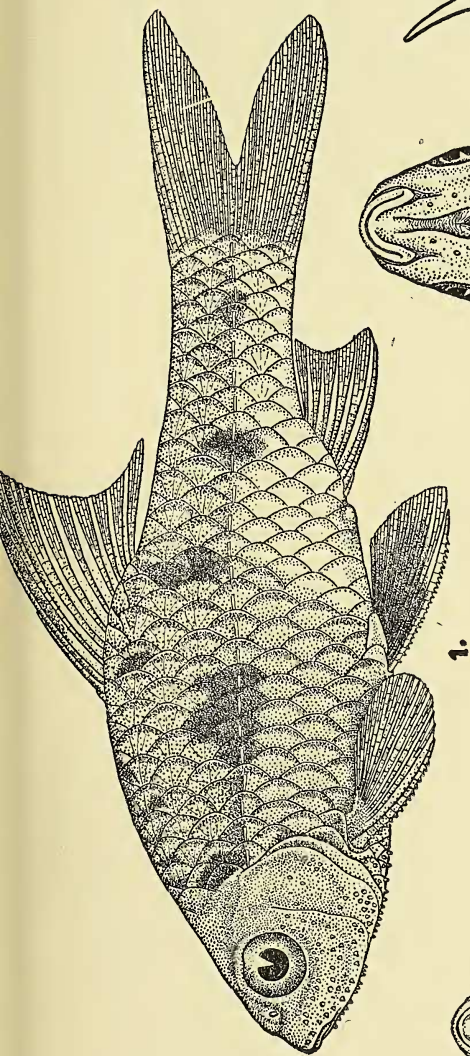
Puntius sahyadriensis is a small well-built carp in which the dorsal profile is slightly more arched than the ventral. The length of the head is contained about 4.3 to 5.2 in the total and 3 to 4 in the



Text-fig. 1. Scales of *Puntius sahyadriensis* sp. nov. (A) scale from body below the dorsal fin $\times 10$. (B) scale from the lateral line $\times 10$. (C) scale from the caudal peduncle $\times 10$.

standard length. The depth of the body is contained 2.6 to 3 times in the standard length and is also equal to or more than the length of

¹ The specific name *sahyadriensis* is derived from the vernacular name 'Sahyadri', which denotes the Western Ghats.



Puntius sahyadriensis, sp. nov.
(For explanation see p. 589)

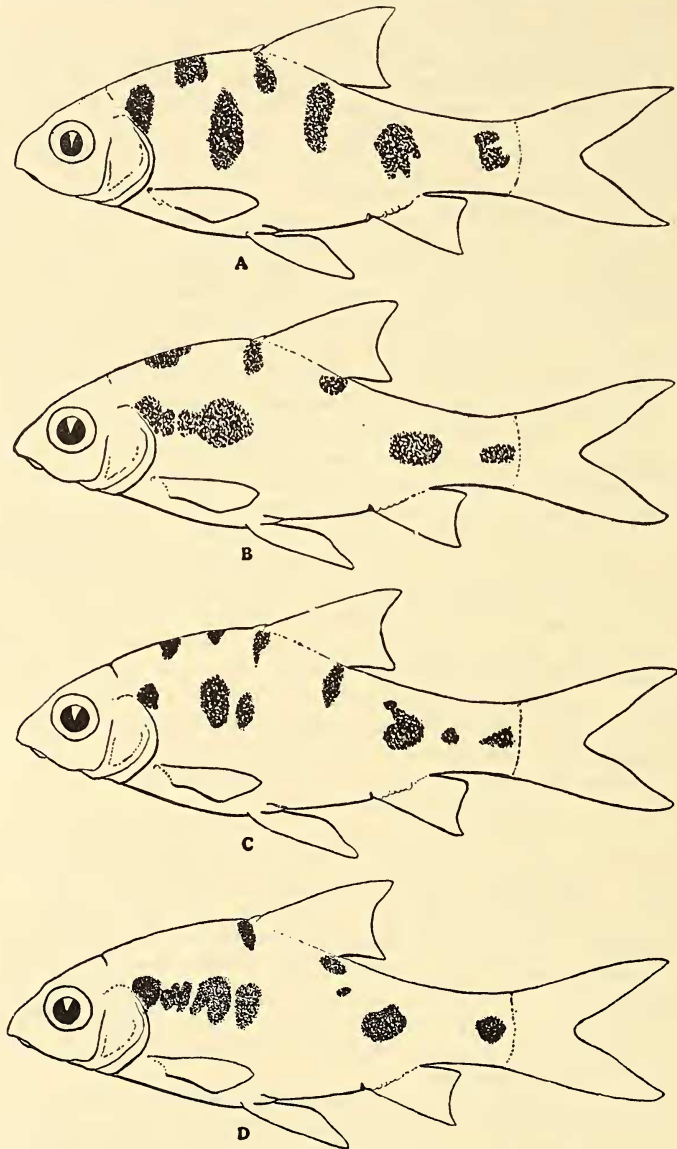
the caudal. The head is more or less blunt, the length of the snout being less than the diameter of the eye. The eyes are large, with free orbital margins and are situated more towards the anterior half of the head. The diameter of the eye is contained 2.75 to 3.5 in the length of the head. The inter-orbital width is greater than the length of the snout, but almost equals the length of the post-orbital part of the head. The mouth is small and slightly oblique, the lips being fleshy and continuous at the angles. The barbels are totally absent.

The scales are well developed and on the lateral line which is complete they number 23 to 24. There are nine rows of scales between the base of the dorsal and the pelvic fins. The predorsal scales number eight. The structure of three scales, one from the side of the body below the origin of the dorsal fin, a second from the lateral line below the dorsal fin and a third from the caudal peduncle are figured and a general description given here. The scales on the sides of the body are slightly broader than long, while those on the caudal peduncle are about as broad as long, or slightly longer. The basal margin of the scale which is truncated or subtruncated is coarsely wavy and produced at the angles. The lateral margins are generally broadly convergent with convex curves. The apical margin is broadly rounded and the basilateral angles of the scales on the anterior part of the body are produced outwards. The radii are strong. There are about 5 to 8 basal radii, which are about as long as the apical radii, which in turn number 2 to about 6. Lateral radii on each side are either one, two or none. The apical circuli are well developed in young specimens, while they tend to become partially degenerate and modified into a series of tubercles in older individuals. They are also more widely spaced than the lateral and basal circuli, which are very dense and closely packed, ranging from about 10 to 55, their number increasing posteriorly. A few incomplete radii are present in the scales. The nuclei in the scales of the anterior part of the body are more elongate in the dorsolateral axis than in the cephalocaudal axis. The nucleus is also broken up into a number of polygonal areas giving it the appearance of a reticulated patch.

The origin of the dorsal fin is opposite or slightly behind that of the pelves, and is nearer to the tip of the snout than to the base of the caudal fin. The dorsal spine is feeble, articulated and in larger specimens is generally longer than the head. The pectoral fin extends upto or slightly overlaps the base of the pelvic fin, except in large female specimens where the pectoral fin is smaller and falls much short of the pelvic base. The pelvic fins are almost as long as the pectorals. The anal fin is short. The caudal fin is deeply forked. The caudal peduncle is about as long as deep and its least height is contained about 1 to 1.5 in its length.

The body colouration is very characteristic in the new species and notes on both normal and sexual colouration are given below. Normally a certain amount of variation is seen in the colour pattern which cannot be strictly attributed to growth alone, for the variations figured are from specimens of about the same size (Text-fig. 2, A-D). The typical pattern seen in most of the specimens examined is that in which there are seven vertical dark blotches on the sides of the body (Text-fig. 2, A). Of these one is just above the gill-opening; a second

on the lateral line in front of the commencement of the dorsal fin; a third dorso-laterally placed midway between the occiput and the commencement of the dorsal fin; a fourth just below the origin of the



Text-fig. 2. Schematic drawings showing the main colour variations seen in specimens of *Puntius sahyadriensis* sp. nov. $\times 1\frac{1}{2}$.

dorsal fin, but not extending upto the lateral line; a fifth below the posterior part of the base of the dorsal fin; a sixth on the lateral line above the anal fin and a seventh just in front of the base of the caudal

fin, on the caudal peduncle. The scales generally have a darker margin.

During the breeding season, both the males and females show brighter colouration, but the vertical blotches on the sides of the body fall more or less within the limits of the variations already indicated in Text-figure 2. In addition, in the female specimens the body is reddish brown throughout, being darker in the anterior and upper half of the body and lighter on the ventral surface. The pelvics, which are black, are tipped with white and the outer ray of the dorsal is also coloured black. In the males, the general body colour is lighter, especially on the ventral surface and posterior part of the body. The pelvics are coloured totally black or are black tipped with white. The outer ray of the dorsal is also coloured black, while the pectoral and the anal fins are slightly tinged dark in some specimens.

Secondary sexual characters seen in the male are the presence of numerous tubercles on the snout, the lower sides of the head and the ventral surface as far back as the pelvic base (Plate 1, figs. 1 and 2). Also the skin on the outer ray of the pectoral and pelvic fins bear a row of numerous short spine-like tubercles. A second row of smaller tubercles are present on the outer half of the first ray of the pelvic fin (Plate 1, figs. 5 and 6).

Bionomics: The gut contents of over 30 specimens of *P. sahyadriensis*, ranging from 25 mm. to 70 mm. were examined and it was found that they feed mainly on algae (*Spirogyra* sp.) which formed about 90% of the food. The rest was composed of sand particles and some digested pulpy matter. It would thus appear that the fish may prove to be very useful for the control of algae and thus indirectly also help to eradicate mosquito larvae. Its beautiful colouration and the abundance in which it is found in the streams in Mahabaleshwar, a place so close to Bombay, should also make it a very good indigenous aquarium fish.

Affinities: In the absence of barbels, the nature of the dorsal spine, the number of lateral line scales, the colouration, etc., *Puntius sahyadriensis*, can be easily distinguished from other species of *Puntius*, such as *P. melanampyx* (Day), *P. arulius* (Jerdon), *P. nigrofasciatus* (Günther), *P. gelius* (Hamilton), etc. From *P. narayani* (Hora) in which species also the barbels are absent, it differs in the following important characters:

Puntius narayani (Hora).

Puntius sahyadriensis sp. nov.

- | | |
|--|---|
| 1. Lateral line scales 22 | Lateral line scales 23-24. |
| 2. Commencement of dorsal in advance of origin of pelvics. | Commencement of dorsal opposite or slightly behind origin of pelvics. |
| 3. Colouration: 3 vertical blotches on sides of body. | At least 7 vertical blotches on sides of body. |

In addition to these, the head in *P. narayani* is contained only 4 times in the standard length, while in the new species it is 3 to 4 times. Also in the former, the depth of the body is contained 2.5 times in the standard length while in the latter it is 2.6 to 3 times. From distributional records it would seem that *P. sahyadriensis* is replaced further south in the Western Ghats by *P. narayani*, the more deep bodied form with a lesser number of scales along the lateral line, to which it evinces greater affinity than to other species of *Puntius* from Peninsular India.

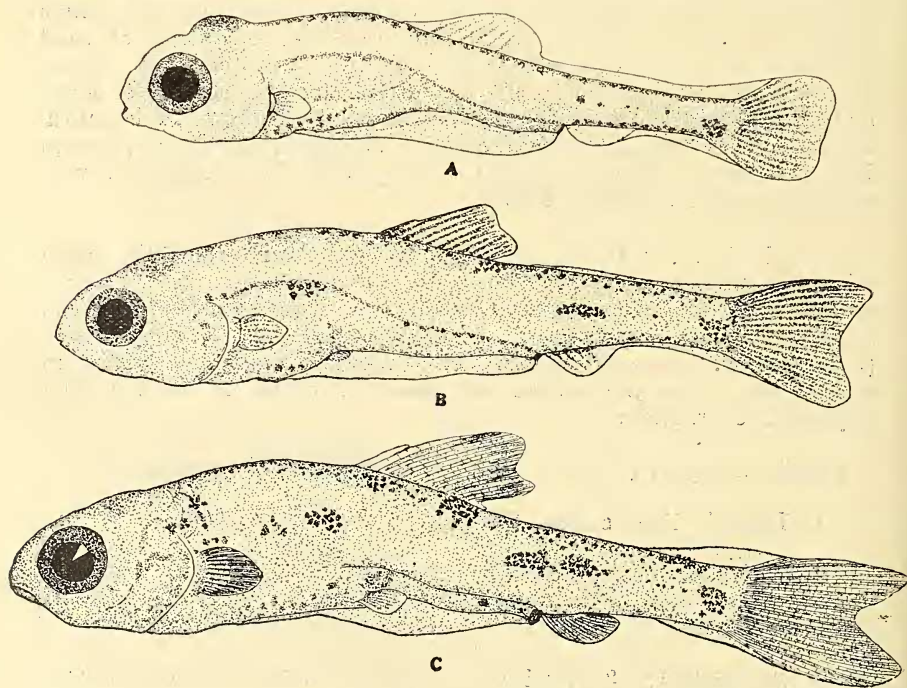
Type specimen: No. F. 687/2.

The type as well as the co-types are preserved in the collection of the Zoological Survey of India.

Type locality: Yenna River, Mahabaleshwar, Satara District, Bombay State.

Notes on Growth: A large number of post-larvae of *P. sahyadriensis*, ranging upwards from 6 mm., were collected from the Yenna River and notes on some of the early post-larval stages are given below.

6 mm. stage: (Text-figure 3, A) By the time the larva is 6 mm. long the yolk is very much reduced and is represented as a few black pigment spots on the ventral side. The larval fin-fold is entire and



Text-fig. 3. Three early post-larval stages in the development of *Puntius sahyadriensis* sp. nov. (A) 6 mm. stage $\times 15\frac{1}{2}$. (B) 7.5 mm. stage $\times 14$ (C) 9 mm. stage $\times 13$.

in the dorsal fin which appears as a slightly raised portion of the fin-fold, the rudiments of fin rays are perceptible. The caudal fin rays are better formed but not distinct. The anal fin is seen as a slightly raised basally thickened portion of the larval fin-fold. Fin rays are perceptible in the pectoral fin which is slightly pedunculate. The eyes are comparatively large, while the snout is considerably shorter. Black pigment spots begin to appear on the dorsal surface and a few on the caudal peduncle.

7.5 mm. s t a g e : (Text-figure 3, B). The yolk is almost completely absorbed and the last trace of 'yolk chromatophores' is seen as three black spots on the ventral side. The dorsal fin rays are gradually formed and just behind the posterior limit of the dorsal fin the larval fin-fold is completely cut off. The caudal fin has become slightly lunate and the fin rays are better developed. In the anal fin, rudiments of four finrays are seen. The pre-anal fold extending from behind the pectorals to the anus persists. The first indication of the pelvic fin is seen as a rudimentary thick portion which in origin is completely ahead of the point of origin of the dorsal fin. The posterior margin of the operculum is slightly more curved than in the previous stage. More pigment spots have appeared on the sides of the body, and five small patches can be made out, the first at the origin of the dorsal fin, a second posterior to the base of the dorsal fin, a third at the base of the caudal fin, a fourth above the anal fin and a fifth in the region above the air-bladder, above and behind the pectorals. Two pigment spots are also present just above the gill-opening and a few on the inner surface of the operculum.

9 mm. s t a g e : (Text-figure 3, C). The general shape of the body is slightly changed from the previous stages, the dorsal profile being more arched. The larval fin-fold on the dorsal side and the post-anal part are much atrophied. The dorsal and caudal finrays are well defined. The anal fin is free from the larval fin-fold and six finrays can be made out in it. The caudal fin is slightly forked. The preanal fin-fold shows a tendency to atrophy. The fin rays in the pectorals are well defined, while those in the pelvics are rudimentary. More pigment spots have appeared on the sides of the body. The first indications of a few scales are seen just above the operculum in the region of the nape. Under the microscope food particles can be made out in the alimentary canal.

11 mm. s t a g e : The dorsal profile is more arched than the ventral profile. The larval fin-fold has almost completely atrophied. The snout is slightly more elongate and the outer margin of the operculum is more curved. The finrays are well developed in all the fins. Scales appear on the nape and on the caudal peduncle. More pigment spots are seen and the colour pattern is better laid out.

13 mm. s t a g e : The scales are well developed all over the body. The lateral line is faintly marked. By this stage the larva assumes the shape characteristic of the adults and thus passes on from the early postlarval phase to the late postlarval phase leading gradually on to the juvenile fish.